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| Big Idea: Operations hold the same fundamental meanings no matter the domain to which they are applied.  (Each operation – addition, subtraction, multiplication, and division – means more or less the same thing no matter what objects are being used.) | | | | | | |
| GRADE | Curriculum Expectation | Possible Problem | | Samples of Student Work | Consolidation Questions | Success Criteria |
| Kindergarten – Grade 1 | * investigate addition and subtraction in everyday activities through the use of manipulatives and visual models or oral exploration * Solve a variety of problems involving the addition and subtraction of whole numbers to 20, using concrete materials and drawings |  | | Video samples can be viewed at  http://plm2012.wikispaces.com/ | * What does the 7 tell you about the picture? * What does the 4 tell? * Why did you think [whatever they say] shows 7 – 4? * If you say that 7 – 4 tells how many more ladybugs than butterflies, why is is helpful to see all 7 ladybugs and all 4 butterflies? * If 7 – 4 told how many ladybugs would be left if 4 left, would you need to see both 7 and 4 bugs? | * Student recognized that 7-4 tells how many more bugs than butterflies * Student thinks of 7-4 as how many more butterflies to match the ladybugs and how many ladybugs would be left if 4 of them went away * Student recognizes why you need different models for different types of subtraction |
| GRADE | Curriculum Expectation | Possible Problem | Samples of Student Work | | Consolidation Questions | Success Criteria |
| Grades 4-6 | * add and subtract two-digit numbers, using a variety of mental strategies * add and subtract decimal numbers to hundredths, including money amounts, using concrete materials, estimation, and algorithms |  |  | | * How would you model each of your problems? * How does each model help you see which meaning of subtraction you were thinking of? * Why is thinking about how much is left really the same as thinking about how more much is needed? How much more is one thing than another? | * Each problem makes sense for the given situation/calculation provided. * Student can articulate why each problem makes sense. * Student can articulate why each problem fits the type of subtraction it is intended to. * (Depending on consolidation questions asked and answered) Student can relate the different meanings of subtraction. |
| Grades 7-8 | * add and subtract fractions with simple like and unlike denominators, using a variety of tools * add and subtract integers, using a variety of tools * solve problems involving addition, sub- traction, multiplication, and division with simple fractions; |  |  | | * How would you model each of your problems? * How does each model help you see which meaning of subtraction you were thinking of? * Why is thinking about how much is left really the same as thinking about how more much is needed? How much more one thing is than another? | * Each problem makes sense for the given situation/calculation provided. * Student can articulate why each problem makes sense. * Student can articulate why each problem fits the type of subtraction it is intended * (Depending on consolidation questions asked and answered) * Student can relate the different meanings of subtraction. |
| Grade 9 Applied and Academic | * - solve problems involving the areas and perimeters of composite two-dimensional shapes |  |  | | * Why did you choose this strategy to find the shaded area? * Why is finding the area of the shaded region a subtraction question? * What would you take away from what to figure out the area of the corners of the square? * How could you figure out the area of the shaded part without taking away? | * Students can show how subtraction is used to solve the problem and that there are different ways of subtracting that can be used to solve this area problem.      * Students can articulate why their strategy makes sense. * Student can articulate why each strategy fits the type of subtraction it is intended to. |
| GRADE | Curriculum Expectation | Possible Problem | Samples of Student Work | | Consolidation Questions | Success Criteria |
| Grades 9-11 | - add and subtract polynomials with up to two variables |  |  | | * What did you do differently in each situation? * Why is thinking about how much is left really the same as thinking about how more much is needed? * How much more one thing is than another? | * Each strategy makes sense for the given situation/calculation provided. * Student can articulate why each strategy makes sense. * Student can articulate why each strategy fits the type of subtraction it is intended to. * (Depending on consolidation questions asked and answered) Student can relate the different meanings of subtraction. |

